

Claims

- [c1] A system for inspecting solar cell arrays, comprising at least one module for assembling a solar cell array, and at least one test module for inspecting said array, said inspection module comprising an electrical source adapted for electrically coupling to said solar cell array so as to generate a forward-bias current through said array in order to cause its heating, and an infrared camera directed at said heated cell to generate thermal images of at least a portion of the array.
- [c2] The system of claim 1, further comprising an image analysis module receiving said thermal image, and inspecting said image so as to identify defects in the solar cell array.
- [c3] The system of claim 1, wherein said defects comprise any of microcracks, defective or missing solder joints.
- [c4] The system of claim 1, wherein said defects occur at interconnections among cells forming said array.
- [c5] The system of claim 4, wherein said defects comprise any of defective solder, weld or adhesive bonds between

any two of the cells in said array.

- [c6] The system of claim 2, wherein said image analysis module employs an edge detection technique to identify defects in said thermal image.
- [c7] The system of claim 2, wherein said image analysis module employs an intensity variance technique to identify defects in said thermal image.
- [c8] The system of claim 1, wherein the density of the forward-bias current ranges from about $70\text{mA}/\text{cm}^2$ to about $200\text{mA}/\text{cm}^2$.
- [c9] The system of claim 1, wherein said solar cell array comprises a plurality of solar cells each formed of a monocrystalline or polycrystalline semiconductor material.
- [c10] The system of claim 1 wherein the system further comprises an automated conveyance element for transporting array components to the inspection module prior to finishing the array.
- [c11] A method for detecting defects in a solar cell, comprising
generating a forward-bias current through the cell to cause its heating, and

inspecting a thermal image of said heated cell to identify defects therein.

[c12] The method of claim 11, further comprising obtaining a thermal image of the heated cell in the infrared region of the electromagnetic spectrum.

[c13] The method of claim 11, wherein said inspecting step comprises identifying defects that disrupt a normal flow of said current through the cell.

[c14] The method of claim 13, wherein said defects comprise any of microcracks or missing solder joints.

[c15] The method of claim 11, wherein said inspecting step comprises comparing the thermal image of a solar cell under inspection with a corresponding thermal image of a reference cell.

[c16] The method of claim 11, further comprising applying an edge detection technique to said thermal image to identify said defects.

[c17] The method of claim 11 wherein the method is practiced in an automated array assembler.

[c18] The method of claim 17 where in the inspection step occurs prior to finishing the array.

[c19] The method of claim 17 where in the inspection step occurs prior to encapsulation of the array.